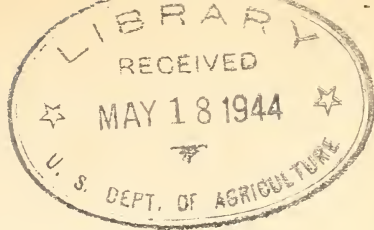


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METHODS OF LEGUME INOCULATION.

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METHODS OF LEGUME INOCULATION.

INTRODUCTION.

The value of legumes ^a as green manures or soil renovators is due to certain bacteria which develop nodules upon the roots of these plants and which have the power of rendering the free nitrogen of the air available for plant growth. Without these bacteria, legumes, like other crops, exhaust the soil of its combined nitrogen. In many regions certain types of these important bacteria are abundant in the soil; in other localities they must be imported, or, in other words, the leguminous crop to be grown there must be inoculated.

The inoculation of a new field may be secured either by the soil-transfer method or by the use of pure cultures of the proper bacteria.

THE FUTILITY OF INOCULATING NONLEGUMINOUS CROPS.

It is useless to attempt to benefit crops other than legumes by treatment with legume cultures. The only way by which a nonleguminous crop, such as corn or cotton, can be benefited by the legume bacteria is either to grow an inoculated leguminous crop the previous year and turn under the stubble or even the entire crop as a green manure, or to grow an inoculated leguminous crop between the rows of the crop which it is desired to benefit. No great increase in crop can be expected from the latter method.

THE INOCULATION OF LEGUMINOUS CROPS.

Extensive experiments conducted by the Bureau of Plant Industry, as well as experiments carried on by other investigators in this country and in Europe, have demonstrated conclusively that each species of legume may be inoculated more successfully by using the bacteria isolated from that species than by using bacteria isolated

^a Plants belonging to the pea family, such as clovers, alfalfa, cowpeas, soy beans, peanuts, field peas, vetch, etc.

from some other species. In other words, the red clover bacteria, which will produce a very successful inoculation when applied to a crop of red clover, will give little, if any, beneficial action when applied to cowpeas or soy beans, and vice versa.

THE SOIL-TRANSFER METHOD OF INOCULATION.

The soil-transfer method consists in scattering over the new ground, at the rate of 200 or 300 pounds to the acre, soil either from a healthy old field of the same crop or from a new field of the same crop that shows abundance of nodules on the roots. To facilitate even scattering the inoculated soil should be thoroughly mixed with several times its weight of ordinary soil, and may be either drilled or broadcasted. If the soil is broadcasted it should be harrowed in immediately, and if possible this should be done toward evening or on a cloudy day, as bright sunshine is very harmful to the bacteria.

THE PURE-CULTURE METHOD OF INOCULATION.

The method of inoculation by pure cultures depends to a certain extent upon the type of pure culture which may be used. Generally speaking, however, a bottle of pure culture of the proper kind of bacteria is opened shortly before the seed is to be planted and the culture mixed with the proper quantity of water and applied to the seed in such a way that all of the seed may be moistened, though not soaked. The seed should be planted as soon as practicable after this treatment; that is, as soon as it is sufficiently dry for convenient handling. Drying may be facilitated by adding dry, sifted earth, preferably from the field in which the leguminous crop is to be grown. It is undesirable to store inoculated seed, as the nodule bacteria often die out rapidly after the seed has been treated with the pure cultures and dried. Inoculated seed should never be dried in the sun. It is also possible to thoroughly mix the pure culture with a considerable quantity of soil, preferably from the field where the legume is to be sown. The treated soil can then be distributed in the same manner as when inoculating by the use of soil from an old field.

The advantages of the artificial cultures lie in the greater ease of their transportation and application as well as in the absence of the danger of introducing harmful weeds or plant diseases, although this method of inoculation, especially in the case of alfalfa, is less certain than the soil-transfer method previously described.

Attempts to secure inoculation either by the use of pure cultures or by the use of soil from old, well-inoculated fields will fail if the crop which is being experimented with is not adapted to the locality or if the climatic conditions during the growing season are unfavorable.

THE DISTRIBUTION OF CULTURES BY THE DEPARTMENT OF AGRICULTURE.

The Bureau of Plant Industry is carrying on field experiments to determine, if possible, what soil conditions are most favorable for the successful inoculation of leguminous crops by the use of pure cultures, and also to determine under what conditions it is useless to attempt to inoculate certain of the legumes without some radical change in the method of fertilizing or cultivating these fields. To extend this experimental work as far as possible, the Department of Agriculture is willing to supply cultures in any reasonable quantity, requiring only the filling in of blank reports which are occasionally forwarded for this purpose.

Approved:

JAMES WILSON,
Secretary of Agriculture.

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